

REMARKS

Upon entry of the present Amendment, claims 1-3, 5, 6, and 8-15 will remain pending in the above-identified application, with claims 1, 3 and 9-11 being withdrawn from consideration and claims 2, 5, 6, 8 and 12-15 standing ready for further action on the merits.

Claims 2, 5-6, 8 and 12 have been amended.

Accordingly, the present amendments to the claims do not introduce new matter into the application as originally filed. Entry of the instant amendment and favorable action on the merits of the claims are earnestly solicited at the present time.

Claim Rejections under 35 USC § 112, 1st and 2nd Paragraphs

Claim 5 has been rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement and under 35 U.S.C. § 112, second paragraph, as being indefinite in the outstanding Office Action.

Regarding the new matter issue, although the Examiner mentions that the original disclosure seems to describe the resin member as being either a reinforcing layer or an adhesive to a rubber layer, the original present specification describes “The resin member usually constitutes a reinforcing layer of a tire. In a side-reinforced tire, the reinforcing layer may be formed on the internal surface thereof at specified intervals, or all round. Moreover, in a core type having a support ring within the tire, an area of a support ring for bonding to the rubber, or a support ring itself may be formed with the resin member or the reinforcing layer” (page 75, lines

8-15). That is, the present specification discloses that the reinforcing layer has the function as the adhesive layer to the rubber (or is also the adhesive layer). It should be noted that the present invention is characterized in that the polyamide layer is directly bonded to the rubber layer without any adhesive.

Further, regarding clarity, the Examiner states that it is not unclear how the resin member can both form at least part of the reinforcing layer and be an adhesive for bonding, especially given that claim 2 explicitly requires that the reinforcing layer is bonded "without any adhesive". However, as mentioned above, since the reinforcing layer itself may be the adhesive layer, claim 5 is not inconsistent with the terminology "without any adhesive" in claim 2.

Claim Rejections under 35 U.S.C. § 103(a)

Claims 2, 5, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishikawa US '840 (US 6,415,840) in view of at least one of Weaver US '513 (US 4,146,513) and Rongone US '979 (US 4,063,979).

Claims 2, 5, 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Boussu US '040 (US 2,884,040) in view of at least one of Weaver US '513 and Rongone US '979 (US 4,063,979) or at least one of Freytag US '696 (US 3,596,696) and Buckwalter US '051 (US 2,927,051).

Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over 1) Nishikawa US '840 in view of at least one of Weaver US '513 and Rongone US '979 or 2) Boussu US '040 in view of at least one of Weaver US '513 and Rongone US '979 or at least one

of Freytag US '696 and Buckwalter US '051, as applied to claim 2 and further in view of the Kirk Othmer article entitled "Rubber Chemicals."

In order to clarify the differences between the present invention and the cited references, we propose to specify a reinforcing layer comprising a resin member comprising a polyamide resin with "a polyamide reinforcing layer" in claim 2, based on the Examples and the like, and to further specify the polyamide reinforcing layer with "a plate- or sheet-like polyamide reinforcing layer", based on page 80, lines 9-15.

Incidentally, regarding the latter amendment, the present specification describes "when the shape of the composite member is a plate- or sheet-like member having a two-dimensional configuration, the composite may be produced by laminating a plate- or sheet-like unvulcanized rubber composition on a resin member" on page 80, lines 9-13. That is, although the term "a plate- or sheet-like resin member" is used in the description of the present invention, the composite member is obtained by laminating the plate- or sheet-like rubber member on the resin member and thus it is clear that the resin member is also plate- or sheet-like. Accordingly, the term "a plate- or sheet-like polyamide reinforcing layer" is not a new matter issue.

The cited references

Nishikawa et al. US '840 (US 6,415,840)

Nishikawa et al. US '840 discloses "A pneumatic tire comprising: a pair of left and right ring-shaped bead cores;

a carcass layer formed from layers in which a plurality of cords disposed parallel to each other are embedded in a covering rubber, both end portions of said carcass layer being folded over said bead cores and turned up such that said carcass layer is formed in an annular shape;

a multi-layer belt portion disposed at an outer side of said carcass portion in a radial direction of the tire;

an annular tread portion disposed at an outer side of said belt portion in the radial direction of the tire;

a pair of side wall portions disposed at the left and right of said tread portion;

at least one sheet of a rubber-filament fiber composite formed from a non-woven fabric having a weight per area of 10 to 300 g/m^2 , said non-woven fabric comprising organic non-parallel filament fibers and a rubber component, said sheet being disposed on at least one of said side wall portions in a vicinity of said carcass layer; and

a rubber reinforcing layer having a crescent-shaped cross-section disposed at an inner side of said carcass layer" (claim 1).

Nishikawa et al. US '840 describes "In the present invention, the important fundamental requirements for the rubber-filament fiber composite are that the composite has a structure which allows the rubber to penetrate into parts between the fiber filaments and that the composite has a structure which allows the filament fiber and the rubber to form respective continuous layers in a relatively long distance and in a relatively wide range" (column 5, lines 43-49).

Regarding the advantages of Nishikawa et al. US '840, there is described "The safety tire of the present invention maintains the properties during ordinary use under the inflated condition at high levels, realizes a light weight, shows remarkably improved properties during use under

the run-flat condition in comparison with those of conventional safety tires having a rubber reinforcing layer, and is used as an ultra-low profile high performance tire having an aspect ratio less than 60% and as a general use passenger car tire having an aspect ratio of 60% or more” (column 15, lines 4-12).

Weaver et al. US ‘513 (US 4,146,513)

Weaver et al. US ‘513 discloses “A method for improving tack and tack retention in uncured, vulcanizable elastomers while maintaining acceptable adhesion of the cured elastomer or reinforcing elements, comprising dispersing in said elastomer a tackifying compound of the structure” (claim 1).

Weaver et al. US ‘513 mentions “During the fabrication of rubber articles, it is common for unvulcanized calendered sheets to be laminated to obtain the desired structural configuration. This technique of building up of layers of uncured elastomer is used extensively in the tire building industry, but also finds utility in the manufacture of other rubber articles such as mechanical goods and hoses. In order that the unvulcanized composites have the necessary mechanical stability toward handling and storage, the elastomeric materials must have sufficient tack so that the desired configuration is retained through the vulcanization step. This tack is the ability of unvulcanized elastomer to adhere to itself or to another elastomer which also has tack. This adhesive property, known as “building tack” plays an important role in the production of rubber goods. In the manufacture of tires, “building tack” holds the inner-liner, beads, plys, sidewalls and tread together prior to vulcanization” (column 1, lines 10-27).

Rongone US '979 (US 4,063,979)

Rongone US '979 discloses "In a method of making a tire having improved resistance to interface separation, including the steps of compounding a sulfur curable diene rubber to give a masterbatch, forming said masterbatch into tire building components, including reinforcing material, plying up the tire building components into a tire and curing in a tire shaper to give a tire, the improvement comprising incorporating 2 to 14 parts of furfural-butadiene resin per 100 parts of said masterbatch" (claim 1).

Rongone US '979 states "I have discovered that the difficulties and problems indicated above are due to the rubber compound blooming which adversely affected the tack and adhesion of the various rubber layers in the tire. I have discovered that these difficulties and problems can be reduced and/or eliminated by changing the compounding of the rubber stock to produce a compounded rubber stock having improved resistance to bloom and improved tack initially and on storing for a period of time to give a tire having improved resistance to interface separation" (column 1, lines 16-26).

Bossu et al. US '040 (US 2,884,040)

Bossu et al. US '040 discloses "A pneumatic tire casing having sidewalls, beads at the edge of said sidewalls and a tread portion, a carcass ply in said casing, a plurality of crown plies in said casing substantially coextensive with said tread portion and disposed outwardly of said carcass ply, each of said plies containing a plurality of substantially parallel reinforcing cables, the carcass ply and a crown ply nearest thereto having their cables extending substantially meridianally of said casing, each of the other crown plies having its cables inclined at an angle to

the cables of said carcass ply, and a narrow flexible and substantially inextensible band in said casing adjacent to said carcass ply and extending substantially parallel with the equator of said tire, and having a width not exceeding about one-half the width of the tread" (claim 1).

Bossu et al. US '040 describes "The cables 7a may be metallic cables such as those shown in the Bourdon U.S. Patent Nos. 2,492,352 and 2,598,033 or they may be cables formed from synthetic fibers such as "nylon" (a long chain linear polyamide) or "Dacron" (a polyethylene ester of terephthalic acid) or natural fibers such as cotton or the like. On the other hand, the band 7 can be a strip of relatively inextensible synthetic plastic such as "nylon" or "Dacron" or other synthetic material or similar physical properties. ... When the reinforcing assembly in the crown portion of the tire is embedded in rubber during the manufacture of the casing, the rubber must bond the hoop 7 perfectly to the remainder of the plies, and thereby contributes to the hooping action" (column 3, lines 29-53).

Freytag et al. US '696 (US 3,596,696)

Freytag et al. US '696 disclose "An article of manufacture comprising vulcanized rubber bonded to a textile, said textile being either an untreated textile or having an adhesion promoting surface coating thereon, the rubber of said article of manufacture adjacent said untreated or said surface coated textile having incorporated therein, prior to vulcanization, as a first additive, 0.2 to 8 percent by weight, based on the amount of rubber employed, of a member selected from the group consisting of hexamethylol melamine, a lower aliphatic carboxylic acid ester of hexamethylol melamine and a partial lower alkyl ether of hexamethylol melamine wherein from 1 to 5 hydroxyl groups are etherified and, as a second additive, a member selected from the

group consisting of resorcinol, m-aminophenol, m-phenylene diamine, resorcinol diacetate, resorcinol propionate, resorcinol butyrate, resorcinol monomethylether, resorcinol monopropylether and 1,5-dihydroxy naphthalene, the amount of said second additive being from 0.5 to 2 times the amount of said first additive, said rubber being selected from the group consisting of natural rubber, polyisoprene, polybutadiene, polychlorobutadiene and copolymers of (a) butadiene and styrene, (b) butadiene and acrylonitrile, (c) isobutylene and isoprene and (d) ethylene and propylene, and blends thereof, and said textile being selected from the group consisting of rayon, polyamide, polyester, polyacrylonitrile and cotton" (claim 1).

Freytag et al. US '696 describes "In a large number of rubber articles designated to withstand considerable stresses in use, the rubber is reinforced with plies of textile materials. Thus, tires, rubber hose and belts are commonly reinforced with filamentary textiles in the form of yarns, cords or fabric" (column 1, lines 11-14). Further, in Example 2, the rubber composition containing sulfur, hexamethylol melamine and the like is bonded to nylon cord filaments.

Regarding the advantages of Freytag et al. US '696, there is described "the present invention ...gives an improved adhesion between rubber and untreated textile materials" (column 1, lines 34-36).

Buckwalter et al. US '051 (US 2,927,051)

Buckwalter et al. US '051 discloses "A method of adhering tire cord to a rubber stock comprising incorporating in said rubber stock resorcinol and the reaction product of formaldehyde and 1,3-diaryl guanidine, thereafter uniting said rubber carcass stock with said tire cord, and thereafter heating the assembly to vulcanize the rubber and form an adhesive-like

condensation product from the resorcinol and the 1,3-diaryl guanidine-formaldehyde reaction product, said adhesive-like product adhering said tire cord to said rubber carcass stock" (claim 1).

Buckwalter et al. US '051 mentions "The classes of textile fibers or filaments that can be adhered to rubbers by the method herein described include native cellulose (*e.g.*, cottons), regenerated cellulose (*e.g.*, rayons), and synthetic linear polyamides (*e.g.*, nylons)" (column 3, lines 59-63). Further, "Resorcinol (I) may be introduced into the rubber, or carbon black masterbatch, in its commercially available solid form, as a concentrated aqueous solution, or as a rubber masterbatch. After the introduction of curing aids, accelerators, antioxidants, *etc.*, are then added and are followed by the addition of 1,3-diaryl guanidine-formaldehyde reaction products (II) (granular or powder) and finally sulfur. Table 1 shows the preferred amounts of (I) and (II) and their practical limits, expressed as parts by weight per 100 parts of rubber hydrocarbon, required for obtaining optimum results" (column 4, lines 4-11). Furthermore, "Vulcanizable rubber stocks containing the adhesive-forming chemicals described above can be reinforced with untreated textiles in the several manufactured forms noted earlier. For example, thin sheets or webs of staple fiber in a random or an oriented state may be coated on one or both sides with the adhesive stock to yield non-woven textile-reinforced rubber; or, the fiber may be incorporated into the rubber by milling, *etc.*, and subsequently sheeted to the desired gauge" (column 4, lines 35-43).

Regarding the advantages of Buckwalter et al. US '051, there is described "one advantage of the present invention resides in the use of 1,3-diaryl guanidine-formaldehyde reaction products as one of the adhesive-forming components. This reaction product is

nonvolatile, so that at the reacting temperatures, there is no danger of evolution of any noxious or toxic vapors" (column 6, lines 11-16).

Rubber Chemicals: Kirk Othmer article entitled "Rubber Chemicals"

Rubber Chemicals describe many compounds having a plurality of polymerizable groups as a vulcanization-activating agent of a rubber.

Comparison of the present invention and the cited references

However, the cited references fail to disclose that the combination of a specific vulcanized rubber layer and a plate- or sheet-like polyamide reinforcing layer are directly bonded to each other without any adhesive.

Concretely, Weaver et al. US '513, Rongone US '979 and Rubber Chemicals fail to disclose or suggest the polyamide.

On the other hand, although Nishikawa et al. US '840, Bossu et al. US '040, Freytag et al. US '696, and Buckwalter et al. US '051 disclose the combination of the tire body comprising the rubber component and the reinforcement component containing or consisting of the polyamide fiber or textile, these references fail to disclose the combination of the rubber layer and the plate-like polyamide layer. In particular, as mentioned in the Response to the last Office Action, the adhesion mechanism to a rubber of the polyamide fiber is extremely different from that of the plate-like polyamide layer.

Therefore, directly bonding the plate-like polyamide layer to the vulcanized rubber layer without any adhesive cannot be predicted from the cited references. In fact, unexpected

advantages can be obtained in the present invention. There is no motivation, disclosure or teaching in the cited references that would lead to the present invention. Thus, it is believed that the claimed invention is novel and nonobvious and that the present application should be in condition for allowance.

More specifically, since the resin members of Nishikawa et al. US '840, Bossu et al. US '040, Freytag et al. US '696 and Buckwalter et al. US '-51 are in fibrous form, the effect of adhesion of the resin layer and the plate-like vulcanized rubber layer without any adhesion would not be predicted from the references, whether considered singly or in combination. Further, since Weaver et al. US '513, Rongone US '979 and Rubber Chemicals fail to disclose the reinforcing layer itself, the effect of the combination of the tire body and the reinforcing layer cannot be expected from the cited references.

On the contrary, according to the present invention, since the tire comprises the tire body comprising the specific vulcanized rubber layer and the plate-like polyamide reinforcing layer, the tire body and the reinforcing layer can be directly bonded to each other with significantly high bonding strength without any adhesive in spite of the combination of the layers.

These advantages are not predictable from the cited references. Accordingly, it is believed that this application should be in condition for allowance. Favorable action to this effect is earnestly solicited.

CONCLUSION

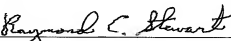
Based upon the amendments and remarks presented herein, the Examiner is respectfully requested to issue a Notice of Allowance clearly indicating that each of the pending claims is allowed.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Raymond C. Stewart, Reg. No. 21,066 at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

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Respectfully submitted,

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